

$$n = \frac{c}{v}$$

*c = Speed of light in a vacuum = 3.00×10^8 m/s

The speed of light in air is 2.9999×10^8 m/s. Since this value is so close to the speed of light in a vacuum, we will consider the index of refraction of air to be 1.00.

Example 1:

The speed of light in a vacuum is 3.00×10^8 m/s. The speed of light in diamond is 1.24×10^8 m/s. What is the index of refraction of diamond?

Example 2: The index of refraction of olive oil is 1.48. Calculate the speed of light in olive oil.

Questions:

- The speed of light in vinegar is 2.30×10^8 m/s. What is the index of refraction for vinegar?
- The speed of light in sapphire is 1.69×10^8 m/s. What is the index of refraction for sapphire?
- The index of refraction for acetone is 1.36. What is the speed of light in acetone?
- Crown glass has an index of refraction of 1.52. What is the speed of light in crown glass?
- Why is the index of refraction a dimensionless quantity? (e.g. Why does it not have any units?)
- Suppose you calculated the speed of light in an unknown substance to be 4.00×10^8 m/s. How could you tell you had made an error in your calculations?

Answers: 1) 1.30 2) 1.78 3) 2.21×10^8 m/s 4) 1.97×10^8 m/s